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April 30, 2014

G. KEITH DENOS, GENERAL MANAGER

Mr. Jared Manning
Assistant State Engineer
Division of Water Rights
1594 West North Temple, Suite 2200
Salt Lake City, Utah 84114-6300

Re: Return Flow Credit – Water Right 55-262 (A12144)

Dear Jared:

Transmitted herewith is a Technical Memorandum prepared by Bowen Collins & Associates for the Association. This Memorandum details the new method for calculating the above referenced return flows we have been discussing with you and others in the State Engineer's office. We request your further consideration on this issue and we are available to meet and discuss any questions you may have with the proposed method of calculation.

We appreciate the efforts expended by the State Engineers office on this and other issues affecting the Association and others and look forward to working with you in the future.

Sincerely:
Provo River Water Users Association

Jeffrey D. Budge, P.E.
Operations & Engineering Manager

Cc Stan Roberts
Teresa Wilhelmsen
Ben Anderson
Susan Odekirk

Provo River Commissioner
Utah Division of Water Rights
Utah Division of Water Rights
Utah Division of Water Rights

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MAY 02 2014

WATER RIGHTS
SALT LAKE

GK

Via Email:

G. Keith Denos, P.E.
Chris Bramhall

PRWUA General Manager
PRWUA General Counsel



Bowen Collins
& Associates, Inc.
CONSULTING ENGINEERS

TECHNICAL MEMORANDUM

TO: Keith Denos
Provo River Water Users Association
285 West 1100 North
Pleasant Grove, Utah 84062

COPIES: Jeff Budge, Provo River Water Users Association
Cristina Nelson, Bowen Collins

FROM: Michael Collins
Bowen Collins and Associates
154 East 14000 South
Draper, Utah 84020

DATE: April 29, 2014

SUBJECT: Return Flow Credit – Water Right 55-262 (A12144) -

JOB NO.: 006-13-01

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WATER RIGHTS
SALT LAKE

INTRODUCTION

The Provo River Water Users Association (Association) has a return flow water right as part of the Deer Creek Division of the Provo River Project (PRP). The water right allows for the exchange of PRP import water return flows in Utah Lake for storage of Provo River water in Deer Creek Reservoir. The present method of determining these return flows is difficult and is dependent on prior year calculations since the inception of the spreadsheet. This allows for compounding of errors and requires third party information to be complete. As a result, the Association and the State Engineer have had a difficult time quantifying the water available under this right. The purpose of this memorandum is to clarify the issue by presenting historical context and a simplified return flow method.

WATER RIGHT SUMMARY

Water right # 55-262 (application A12144) is in the name of the USBR and has a priority date of April 3, 1936. The right allows the Association to reclaim PRP foreign water return flows and other PRP flows that accumulate in Utah Lake by an exchange the following year for natural flow Provo River water stored in Deer Creek Reservoir. PRP water accumulated

in Utah Lake typically consists of PRP import water return flows captured in Utah Lake. PRP water in Utah Lake could also be water released from Deer Creek Reservoir for power capacity replacement under the 1938 Power Contract, although it is understood this water release rarely occurs. The total water stored by exchange in Deer Creek Reservoir under A12144 and A12141 (a similar return flow right on the Weber River diversions) may not exceed 30,000 ac-feet annually. By agreement, the Association must compensate PacifiCorp for energy losses resulting from storage of winter power water in excess of a ten year running average of 5,000 ac-ft per year and 10,000 ac-ft in a single year (1938 Power Contract). Also, the Association must compensate CUWCD for power losses resulting from storage of up to an additional 20,000 ac-ft of power water that would otherwise be used for power generation at the Olmsted Power Plant (1990 Olmsted Condemnation Contract).

EXISTING USE OF RETURN FLOWS

In the past, the Association has used what is called the May 1 election to move return flows from Utah Lake to Deer Creek Reservoir. This “May 1 election” is a mechanism by which flows are moved from Utah Lake to Deer Creek without incurring power interference charges. This election is defined in the 1938 Power Contract and subsequent Deer Creek Jordanelle Agreement among the United States (USBR), Central Utah Water Conservancy District (CUWCD), and the Association. This election allows the Association to move up to 10,000 acre-feet annually or not more than 50,000 acre-feet in a ten year period from Utah Lake to Deer Creek Reservoir without incurring power interference charges.

WATER RIGHT YIELD

A water right proof was submitted by the USBR in 1963, but this water right has never been certificated due to the State Engineer’s uncertainty as to the best method of calculating return flow volumes to Utah Lake. In some past years, the volume of return flow eligible for recovery by exchange has been calculated via a “return flow spreadsheet”. This spreadsheet appears to have been originally developed by the State Engineer as a method of estimating return flow for Association water rights. The return flow spreadsheet has not been maintained since 2003. This is primarily due to water accounting changes and the lack of availability of some data from third parties needed to make these calculations.

The historic approach to calculating return flow used by the State Engineer has a number of problems:

1. The return flow spreadsheet is complicated and the input data is not always available from third parties. If a single input data point is not available in any one year it makes calculation of percent import water in each subsequent year incorrect and consequently the total return flow value calculated is affected in each subsequent year. As such, the spreadsheet has not been maintained for the past 10 years. In addition, Association shareholders have had changes in their water usage and corresponding changes to the total volume of PRP water used in Utah County.

2. The actual quantity of water used in Utah County changes from year to year based on shareholders' annual water uses. The return flow should be based on actual deliveries in Utah County rather than an assumed constant Utah County ratio as has been the case with the return flow spreadsheet. Utah County use also changes as shares in irrigation companies served by the Association are transferred between different owners. The newly constructed Provo River Aqueduct (PRA) has also changed the amount of return flow to Utah Lake. Also, previous methods for calculating return flow may not have factored in all the PRP water delivered to Utah County thru the Point of the Mountain (POM) facilities. To reflect these changes an updated approach is required.

PROVO RIVER PROJECT WATER USE IN UTAH COUNTY

The use of PRP water in Utah County occurs through a variety of shareholder service areas, exchange agreements and shareholder owned facilities. For purposes of discussion, the Utah County PRP water use has been categorized into two groups:

1. Shareholders with service areas that are exclusively within Utah County
2. Shareholders with service areas or water exchange agreements that include deliveries in both Salt Lake County and Utah County

Shareholders with Exclusive Use in Utah County. The Association shareholders with service areas exclusively in Utah County are presented in Table 3 below.

Table 1
Association Shareholders Exclusively in Utah County

Utah County Shareholders	PRP Shares
Metropolitan Water District of Provo City	8,000
Highland Conservation District	5,010
Metropolitan Water District of Orem	2,254
Provo Bench Canal and Irrigation	2,000
Pleasant Grove Irrigation company	1,011
American Fork Metropolitan Water District	500
Lehi City	500
Pleasant Grove Metropolitan Water District	300
Lindon City	200
Dixon Irrigation Company	300
Total	20,075

It is noted that actual annual water use from these shareholders will vary each year and may total more than 20,075 acre-feet in years when sufficient PRP holdover storage or extra allotment is used by individual shareholders.

Shareholders with Some Deliveries to Utah County. Both the Metropolitan Water District of Salt Lake & Sandy (MWDSLS) and Provo Reservoir Water Users Company (PRWUC) deliver PRP water to both Utah County and Salt Lake County by virtue of their service areas and/or by exchange agreements with canal companies serving Utah County.

MWDSLS holds 61,700 shares of the Association and provides PRP water to Utah County in connection with its deliveries to the South Branch of the Utah Lake Distributing Company (ULDC). PRP water is delivered to ULDC by diverting water from the end of the PRA into the Point of the Mountain (POM) Penstock. This water powers a turbine adjacent to the Jordan River and then is diverted into the ULDC South Branch canal. The turbine is used to pump water from the Jordan River into the North Branch canal of the ULDC. Only the water that flows thru the penstock (and into the South Branch canal) is considered PRP deliveries to Utah County. Based on available Association and MWDSLS records, annual PRP penstock deliveries to Utah County varied substantially during the period 2001-2013. MWDSLS deliveries to Utah County can drastically affect the total amount of PRP water use in Utah County in any given year.

PRWUC holds 16,000 shares of the Association and provides PRP water to multiple entities via shares owned in PRWUC. PRWUC is organized into 4 districts: Welby, Jacob, Alpine and Orem. Jordan Valley Water Conservancy District (JVWCD) owns 100 percent of the Welby and Jacob districts and some portions of the Alpine and Orem districts. Alpine Irrigation Company, Orem City and several other Utah County water users and cities comprise the other portions of the Alpine and Orem Districts. Annual water reports of the Association provide sufficient data to account for the amount of PRP water used by Utah County users associated with the PRWUC's Alpine and Orem Districts, but JVWCD deliveries need to be accounted for separately. JVWCD's Welby Jacob exchange allows for PRP water to be delivered into Utah County via the POM siphon into the Jacob Canal. JVWCD deliveries to the Jacob Canal may come from either PRP sources, Provo River natural flows water rights, or from Jordan River sources. Only those JVWCD Jacob Canal deliveries that originate from PRP waters (through the POM siphon) are included as PRP water used in Utah County.

It is possible that the MWDSLS's deliveries and JVWCD's portion of PRWUC deliveries to Utah County may not have been accounted for in previous methods of calculating return flows to Utah Lake. It is critical that any future calculation of Utah Lake return flows include these water deliveries and that calculations are based on the actual Utah County PRP deliveries in any given year.

RETURN FLOW CALCULATION

The Association desires to have a return flow calculation that is easily developed and based on numbers that can be obtained early enough to allow for a determination of the return flows at the end of the water year. The proposed calculation of return flows is based on the following criteria:

- Return flows should be based on the amount of water delivered to Utah County each year by the Association.
- The amount of return flows eligible for the Association to claim should be based on the percent of water of the Association that is imported for any given year.
- The percent of return flows available to claim should be based on the Utah County water uses and the typical return flow percentage applicable for each use.

Based on these criteria, the overall return flow would be calculated by determining the amount of water delivered to Utah County, multiplied by the percentage of deliveries by the Association from imported flows, multiplied by the composite return flow percentages for each Utah County user.

Table 2 shows the Utah County uses for the water years 2009-2013 for each individual shareholder. Total Utah County uses in this period varied from just over 14,000 acre-feet to over 32,000 acre-feet. This table assigns return flow percentages to each use for each year to develop an overall average return flow credit percentage for the period of 54.4 percent.

Table 3 shows the total Association diversions from each of its basins for the years 1995-2013. It also shows usage within from 2001-2013. The percentage of imported flow is calculated by comparing the total of the Duchesne and Weber River diversions to the total diversions of the Association. The total return flow is then calculated by multiplying the previous year's Utah County use (see Table 2) by the percentage of imported flow from the previous year, multiplied by the overall return flow percentage of 54.4 percent calculated in Table 2. The overall return flows for the period from 2002-2013 vary from 2,317 acre-feet to 24,141 acre-feet.

These return flows will also have to be adjusted for evaporation losses in Utah Lake. Evaporation losses will depend on how many years the water is left in the lake. As long as the lake does not spill, the return flows remain in the lake subject to a reduction for evaporation.

CONCLUSIONS

The existing Utah Lake Return flow spreadsheet is complicated and requires input data points that are not always available. A missing data point in any one year perpetuates errors to the following year's calculation of return flows. A return flow calculation that relies on this spreadsheet invites errors and perpetuates a climate of uncertainty regarding the volume of water eligible for exchange under this water right. When the Association is uncertain as to the volume eligible for exchange, the full right is often not claimed for exchange.

A new method of calculating return flow volume eligible for exchange is proposed. This method would rely on three factors: the amount of Utah County deliveries, the percentage of imported flow, and an overall return flow percentage for the Utah County uses.

Table 2
Calculation of Return Flow Credit-Flows Into Utah County
Provo River Water Users Association

PRWUA shareholders with Utah County Use	Use Category	Return Flow %	2013 water Use (AcFt)	Return Flow 2013	2012 water Use (AcFt)	Return Flow 2012	2011 water Use (AcFt)	Return Flow 2011	2010 water Use (AcFt)	Return Flow 2010	2009 water Use (AcFt)	Return Flow 2009
Orem MWD	M&I	80%	2,740	2,192	1,617	1,294	1,370	1,096	3,372	2,698	1,203	962
Dixon Irrig. Co. (Orem MWD)	M&I	80%	0	0	531	425	14	11	378	302	238	190
Provo MWD	M&I	80%	3,896	3,117	3,025	2,420	1,612	1,290	3,178	2,542	3,528	2,822
American Fork MWD	Irrigation	35%	162	57	732	256	237	83	493	173	290	102
HCD -Highland Conservation District	Irrigation	35%	377	132	1,094	383	1,934	677	1,458	510	1,315	460
HCD -Highland City	M&I	80%	1,388	1,110	2,674	2,139	96	77	1,751	1,401	999	799
HCD -Lehi City	Irrigation	35%	306	107	866	303	663	232	842	295	479	168
HCD -American Fork City	Irrigation	35%	288	101	574	201	17	6	370	130	256	90
Lehi City	M&I	80%	336	269	527	422	377	302	500	400	276	221
Lindon City	M&I	80%	106	85	267	214	19	15	194	155	407	326
Pleasant Grove Irrigation	Irrigation	35%	244	85	1,110	389	637	223	792	277	1,009	353
Pleasant Grove MWD	M&I	80%	0	0	359	287	48	38	497	398	540	432
Provo Bench Irrigation	Irrigation	35%	520	182	1,195	418	0	0	1,180	413	1,044	365
PRWUC - Orem MWD	Irrigation	35%	0	0	4,789	1,676	507	177	3,087	1,080	3,158	1,105
PRWUC - Alpine District	Irrigation	35%	412	144	2,286	800	2,129	745	1,534	537	1,066	373
PRWUC - Pleasant Grove MWD	Irrigation	35%	0	0	361	126	11	4	175	61	213	75
PRWUC - Highland City	Irrigation	35%	0	0	239	84	45	16	420	147	233	82
PRWUC - Lehi City	Irrigation	35%	139	49	141	49	203	71	184	64	938	328
PRWUC - Lehi Irrigation	Irrigation	35%	183	64	483	169	223	78	695	243	0	0
PRWUC - American Fork City	Irrigation	35%	19	7	95	33	5	2	35	12	47	16
PRWUC- JVVCD, Project Water Deliveries	Flood Irrigation	50%	0	0	1,434	717	4,057	2,029	2,121	1,061	2,515	1,258
ULDCF South Branch	Flood Irrigation	50%	4,660	2,330	7,744	3,872	0	0	8,534	4,267	12,024	6,012
Total			15,776	10,030	32,143	16,677	14,204	7,171	31,790	17,166	31,778	16,539
% Return Flow				63.58%		51.88%		50.49%		54.00%		52.05%

2013-2009	Average Return flow % =	54.40%
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Table 3
Return Flow Credit Calculations
Provo River Water Users Association
Import Water Percentage in Utah County

Year	Duchesne	Weber	Provo	Total	% Import	Utah County Use	Utah County Use-Imported Flow	Return Flow Percentage (54.4%)
1995	28,778	43,751	54,144	126,673	57.3%			
1996	30,290	45,126	51,108	126,524	59.6%			
1997	38,102	8,455	87,668	134,225	34.7%			
1998	31,599	28,013	103,171	162,783	36.6%			
1999	30,915	36,837	27,751	95,503	70.9%			
2000	27,717	27,940	24,199	79,856	69.7%			
2001	27,316	26,400	18,287	72,003	74.6%	23,896		
2002	20,990	23,784	13,558	58,332	76.8%	15,269	17,827	9,698
2003	28,447	28,083	23,136	79,666	71.0%	20,819	11,720	6,376
2004	27,355	17,677	23,417	68,449	65.8%	14,057	14,773	8,036
2005	27,980	60,180	79,710	167,870	52.5%	17,103	9,248	5,031
2006	22,098	30,042	92,133	144,273	36.1%	37,013	8,982	4,886
2007	26,282	27,960	5,701	59,943	90.5%	49,041	13,376	7,277
2008	25,282	41,771	16,236	83,289	80.5%	28,048	44,377	24,141
2009	27,446	54,078	61,129	142,653	57.1%	31,778	22,580	12,284
2010	28,161	42,115	8,068	78,344	89.7%	31,790	18,161	9,879
2011	10,678	34,339	105,144	150,161	30.0%	14,205	28,516	15,513
2012	18,519	8,770	1,380	28,669	95.2%	32,143	4,259	2,317
2013	23,979	9,836	1,500	35,315	95.8%	15,775	30,596	16,644
Average	26,418	31,324	41,971	99,712	65.5%	25,587	18,701	10,173

Notes:

1. Utah County use based on percent import flow from previous year times Utah County use previous year.
2. Return flow credit calculation are shown on Table 2
3. Total return flows do not include the evaporation losses from storage in Utah Lake